

VALENCY AND CHEMICAL AFFINITY.

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Two and a half years ago (Trans. R.S.S.A., vol. i., part 2, p. 413 ; also J.C.S., November, 1909) the author showed that the atomic weights could be fairly exactly calculated by making use of a *proton*, μ , of atomic weight about 0.009.

The author has now discovered evidence that this proton may really be, as was suspected in 1909, the true cause of valency and of chemical combination. This evidence consists in the fact that practically the same value of μ is given by the three most exact determinations of molecular ratios that he is acquainted with.

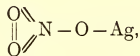
(i.) *Synthesis of Water*.—This gives $H = 1.0077$ when oxygen = 16. Assume as before that hydrogen consists of $\bar{H}$ (non-valent, of atomic weight 1 exactly) plus μ , and that oxygen = $16\bar{H} + 2\mu$.

Then we have—

$$\frac{16(1 + \mu)}{16 + 2\mu} = 1.0077 ;$$

or by the binomial theorem, $1.0077 = 1 + \frac{7}{8}\mu$; whence $\mu = 0.0088$.

(ii.) *Stas's Corrected Ratio of Silver Nitrate to Silver*.—This was found to be 1.57473. Assume silver nitrate to be—



i.e., with oxygen tetravalent and eight bonds. Its molecular weight is then—

$$108 + 14 + 48 + 8\mu = 170 + 8\mu \ (\bar{H} = 1),$$

when metallic silver is $108\bar{H}$.

Hence—

$$170 + 8\mu = 108 \times 1.57473.$$

This gives—

$$\mu = 0.00885.$$

(iii.) *Conversion of Chlorate to Chloride.*—The latest experimental ratio of KClO_3/KCl is 1.643819. Assume that KClO_3 is—



(i.e., that chlorine is always monovalent), and that—

$$\text{K} = 39.100 \bar{\text{H}},$$

and—

$$\text{Cl} = 35.500 \bar{\text{H}}.$$

Then—

$$\frac{\text{KClO}_3 + 5\mu}{\text{KCl} + \mu} = 1.643819.$$

This gives—

$$\mu = 0.0086.$$

Generally speaking, the author is inclined to think that the tetravalency of oxygen should play a large part in chemical theory, and should be used to explain the so-called “higher valencies” of most of the elements.